Resonance & Q

Electrical Engineering

Where reactances cancel, how sharp the peak, and the voltage Q builds.

At resonance the inductive and capacitive reactances cancel and the circuit looks purely resistive.

$$f_o = 1/(2\pi\sqrt{(LC)}) \cdot Q = \omega_o L/R \cdot BW = f_o/Q$$

10 mH with 100 nF	$f_o \approx 5.03$ kHz
Q = 50 at 5 kHz $f_o \div Q$.	BW = 100 Hz
Series tank at f_o	Z = R, current peaks

THE COMMON MISTAKE

× **Expecting a parallel tank to peak in current**

✓ **A parallel tank peaks in impedance**

Series resonance minimises impedance and maximises current; parallel resonance does the reverse. The formula for f_o is the same.

High Q means a narrow band and large internal voltages: a series tank can develop Q times the source voltage across L.